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THE MEDICAL PROFESSION AND THE ISSUES WHICH CONFRONT IT.[1]

THE American Medical Association begins its fifth-seventh annual session under the most auspicious circumstances. After an interval of forty-one years it again meets in Boston, the guest of this great commonwealth which has ably upheld the highest medical traditions since the founding of New England.

Another cause of felicitation—the sectional differences in New York have been overcome and the Empire State for the first time in twenty-five years presents a unified delegation.

The house of delegates of the American Medical Association (which technically is the American Medical Association) represents directly about 55,000 and indirectly the 120,000 regular practitioners of medicine in the United States. The official organ, the *Journal,* reaches each week over 43,000 subscribers, and under the able editorship of Dr. George H. Simmons, has become the leading professional magazine in the world.

The medical profession is to be congratulated upon these evidences of a useful organization, but much remains to be done. In his individual capacity the medical man has not been found wanting. Go where you will in civilized lands, you will find the doctor, self-sacrificing, patient and charitable, upholding the honor and dignity of his noble calling. Collectively, medical men do not have the influence

[1] Address of the president of the American Medical Association, Boston, June 5, 1906.

which we might expect and without which great movements for the welfare of humanity can not be carried on. A lack of unity has prevented a realization of our hopes and if we are to gain and maintain the preeminent position to which we are entitled, we must unite for the common good.

The present organization of the American Medical Association is but a beginning; we must further the interests of this body unselfishly, not for ourselves alone, but that we may better fufill our sacred obligations to mankind. The people must be educated up to a point where they can understand the broad humanitarianism of modern medicine. Society appreciates the saving of a sick person's life by the skilled physician, but fails to see the priceless gifts to the human race made by preventive medicine and sanitary science. It views everything in detail and misses the perspective. We have failed to secure the support of the mass of the people to much needed sanitary reforms because we have appealed to them as one individual to another without the weight of an authoritative organization.

That the people are ignorant of medical affairs is due to bad education rather than prejudice. They are more than two decades behind advanced medical thought; it is our duty to keep them better informed. The theory of medicine did not contain the essential principles of a science until within the last quarter of a century. Originally a part of priestcraft, the profession has its beginnings in a time of mysticism and superstition. Anatomy, gross pathology and chemistry were among the early foundation stones which made progress possible. Clinical treatment was based upon a very few specific remedies and a considerable number of drugs of proved value in the cure or alleviation of disease. But lacking a sound theory of causation, the results were not much better in the average self-limited malady than those claimed by the various 'systems' based upon the giving of inert or useless remedies which, like the incantation of the Indian medicine man, kept the patient and friends interested until cure came about through natural processes. The laity found that the large majority of sick persons got well under any, all or no treatment, and not rightly understanding the reason have never been able to comprehend why one method or form of treatment, as long as it apparently yielded about the same average of results, was not as good as another.

The germ theory promulgated by Pasteur and given surgical significance by Lister, strengthened our foundation by adding to it the long-sought-for causation of the majority of diseases and this, with the aid of experimental research, has led the practise of medicine out of the wilderness and established it as one of the exact sciences.

New and fundamental truths have followed each other so rapidly that we have scarcely been able to digest them and much less can we expect the public to have kept pace. The layman's view is that of twenty-five years ago. He accepts with avidity new dogmas and 'pathys' based upon theories incredibly foolish in the light of modern investigation, and we have allowed him to become fixed in these beliefs. We have permitted the public to be educated by patent medicine advertisements and the voluble charlatanism of the commercially interested. In return we are classed with these schemers, and efforts for the general good are believed to be selfishly inspired.

The Utopianism of our profession is too idealistic for ready comprehension in this commercial age. The time has come for the public to be taken into our confidence; if we wish better results we must enlighten

the people, for with them lies the final word.

THE PROFESSION AND THE PUBLIC.

General sanitary matters of the greatest importance are becoming understood through medical influences. The public has been and is being educated in regard to 'the great white plague,' tuberculosis, and statistics are beginning to show the effect of this diffusion of knowledge. In Massachusetts and some other states a committee has been appointed in each district to promulgate measures for the relief and control of tuberculosis. This should be imitated in every state in the union.

We can already see the good which has resulted from the teaching of the habits of mosquitoes, the short distances they travel from their breeding places, and especially the necessity for the quarantine of patients afflicted with yellow fever and malaria, not directly to protect mankind, but to prevent infection of the little pests who act as carriers of the contagious microorganisms.

Society must be taught the early symptoms of cancer, the greatest foe of humanity, that its manifestations may be recognized while in the curable period. A propaganda of this kind, inaugurated by the profession of Germany, has borne fruit.

The typhoid fever crime of cities through polluted water supply is not the least of the many branches of popular education. There is no reason why a man who has become infected with typhoid from a city's neglect should not sue for damages as he would for personal injury sustained from falling through a defective sidewalk. Unavoidable sickness is bad enough, but when we stop to consider that the life of the individual is worth $5,000 to the state, and that those who recover undergo great disability and expense, the continuance of unsanitary conditions is criminal. The experience of Vienna, which was converted from a typhoid center to one of freedom from such outbreaks by bringing in a pure water supply, has now been repeated over and over again in every civilized land. Yet hundreds of deaths from this preventable source yearly attest that the lesson has not yet been learned.

How can this work of education be best continued? The answer, as shown by our very efficient national organizer, Dr. J. N. McCormack, is through the local society. Occasional meetings to which the public shall be invited, must be devoted to questions of general interest, and the proceedings published in the local newspapers. The county society must become the unit, and the allied professions of pharmacy and dentistry urged to attend and take part in the deliberations.

To the *Ladies' Home Journal* and *Collier's Weekly* the public owe the successful crusade against poisonous substances and intoxicating beverages which are sold under the guise of patent medicines, 'patent' only in the sense that the name is copyrighted; the constituents can be changed at any time and in any way.

Do you think that our American mothers will continue to give 'Kopp's Baby's Friend' and 'Mother Winslow's Soothing Syrup' to their babes when they find that these mixtures contain opium and that instead of securing rest the little ones are narcotized and that many deaths are directly attributable to this cause?

Will the American people continue to use bromo-seltzer and similar dangerous preparations to an extent which causes them to exhibit blueness of the skin surfaces from poisonous coal-tar products, or become victims of drug habits from cocaine catarrh cures, when they discover the harmful and dangerous character of these agents?

Will our prominent people, statesmen,

politicians, ministers and ladies of note continue to allow their photographs over signed testimonials to be published, telling their fellow-citizens how much better they have felt after taking Peruna, Warner's Safe Cure and the various nervines and tonics, when they find that most of these preparations depend upon alcohol for the stimulating effects which they describe? The success of most patent medicines depends upon the fact that they contain drugs and stimulants which create a craving and must be repeated. Once get the public conscience awakened and we shall have a demand that every patent remedy, before being sold, shall have its exact component parts printed upon its label, and its claims to cure verified by scientific investigation. The action of the post-office department in denying the use of the mail service to some of the worst offenders against common decency is to be commended.

PUBLIC HEATH LEGISLATION.

One of the few misfortunes of the individual freedom afforded by a republican form of government is that it enables the most ignorant man through prejudice to interfere with and delay needed legislation, with the result that, by the time the law can be passed, the immediate object to be obtained has disappeared.

In Germany compulsory vaccination has practically caused small-pox to disappear from the army and country, a person properly protected being immune. In the state of Minnesota inability to enforce vaccination in the late small-pox epidemic permitted from a few sources, 27,876 persons to become infected with this disorder; all due to a small but vociferous band of anti-vaccination agitators.

Contagious disease in any place is not a matter of local or state interest alone, as the ease and freedom of transportation render local control impracticable and properly place it in the hands of the general government.

The keenness with which the American people are watching the affairs at Panama argues well for the future. The communication of Dr. C. A. L. Reed awakened public interest. His portrayal of red tape and obstruction to sanitation in the Canal Zone has resulted in obtaining for that most able army medical officer, Colonel Gorgas, power to carry out the necessary reforms and has made the Canal Zone the most sanitary place in Latin America.

Compare our record in the Spanish American War with that of the Japanese in the war with Russia. We had fourteen deaths from disease to one from wounds and more than 95 per cent. due to disregard of the simplest problems in sanitation, therefore, unnecessary and avoidable. In the Japanese army there were four deaths from wounds to one from disease, a difference of fifty-six to one. This was not due to the fact that the Japanese had superior knowledge, but that their medical officers were thoroughly organized and in sanitary matters were supreme. The knowledge which they used was obtained in western institutions and was the product of the occidental, not the oriental civilization.

The army and navy medical departments have worked intelligently against overwhelming odds. Their individual members have international reputations honestly achieved. Their schools for the special training of their men are in the highest degree efficient and deserving of every praise; but the departments have been so small as to be unable to act even as nuclei about which in time of war competent forces could be gathered and the militia of our country enter into conflict fearfully handicapped. The indications, however, are that these matters will now be rectified, and if so it will guarantee to the patriotic

American that, should he again be called upon to serve his country, his enemies will be in front and that he will not be destroyed by his own side through neglect of sanitary laws.

The public health and marine hospital service has been and is doing splendid work in sanitation. Its skilled investigators have revolutionized quarantine measures and have placed preventive medicine on a solid basis. Their powers should be extended so that such unnecessary outbreaks as occurred in New Orleans shall not be repeated. They should be given control of national quarantine in all its phases.

MEDICAL EDUCATION, STATE LICENSURE AND RECIPROCITY.

What is needed is a higher standard of requirements and more and better supervision of professional schools. The council on medical education is working hard and is now in a position not only to show what should be done but to initiate reforms. No more important work has ever been taken up by the profession. At the present time medical education is uncontrolled and each state has its own standard of requirements. We can not rid ourselves of dogmas and 'pathys' until we can secure a universal primary law as to the minimum amount of knowledge on fundamental branches. To accomplish this the American Medical Association must cooperate with and encourage medical colleges to do better work. The profession owes it to itself to investigate in some manner what the schools are actually doing and to make it known whether or not they fulfill their obligations to the student. No well conducted college could object to such reasonable supervision.

Another question of great importance is that of reciprocity in medical license. The conditions now are well-nigh intolerable and restrain the individual freedom guaranteed by the constitution. The boundaries between states are imaginary lines; yet a physician on one side of a border can not relieve human suffering on the opposite side without becoming amenable to the law or subjecting himself to vexatious examinations which he has already successfully passed in his own state. This must be met and speedily by agreement between examining boards as to the minimum of requirements. After all this is but a part of the educational problem. If we could solve this, all licensing boards could at once adopt more uniform examinations and reciprocity.

RELATIONS TO INSURANCE COMPANIES, CORPORATIONS, ETC.

We come now to consider some abuses from which the physician suffers. It is a matter of professional pride that, in the general condemnation of the life insurance companies, although every other part of the control has been shown to be corrupt, no breath of scandal has touched the medical department. Yet the local examiner has the most cause of all to be dissatisfied. The New York Life, some years ago, cut the fee for examination forty per cent., apparently not as a matter of economy, for at that time the most corrupt practises existed, but rather to enable the agent more easily to pass 'new business' at any cost. This action has lately been imitated by the Equitable and some others and has resulted in forcing the resignation of many of their best examiners. The general officers have taken great credit upon themselves for voluntarily reducing their salaries twenty per cent. It is a rank injustice that the one body of men who have emerged clean from the insurance scandals should suffer the most for the crimes of others. A thorough medical examination to prevent fraud by the admission of unsafe risks is essential. With few exceptions the line companies pay a fair fee and

less should not be accepted. The casualty companies, such as the Maryland, are the worst offenders, and some concerted action should be taken to compel them to mend their evil ways.

Lodge practise is another scheme by which officers of an association draw salaries ostensibly to give medical services at a figure below the possible point at which a professional man can live and continue his education. The people are badly served, as competent physicians can not be secured to do the work, and the whole scheme is properly condemned by the various medical associations all over the country.

Public service corporations abuse hospital privileges in a way that is no more or less than an open scandal. In Pittsburg the steel companies pay $1 a day for the care of their injured men at the hospitals and for the class of patients under discussion this can not be provided for less than $1.60 per day. The companies pay the surgeons at the hospitals absolutely nothing for their services to its injured, which amount to thousands of dollars a year. The same conditions exist with many of the large railroad and street-car companies and other public corporations.

Hospital abuse by patients who are able to pay, through the neglect and indifference of the trustees, is prevalent; and thereby the profession is robbed of just returns for labor and the funds of charitable persons misused to an extent which is almost beyond belief. All hospitals should have competent individuals whose business it is to see that no one secures free treatment who is able to pay.

Some great hospitals go still further and receive any patient, rich or poor, allow him to have a suite of rooms and bath and several nurses if he can pay for the same; but will not allow him, even if he is willing to do so, to pay the surgeon who operates upon, or the medical man who takes care of, him. If the patient is disposed to be more just than the trustees of the hospital, he can do so only by giving a gratuity at Christmas, as would be done with a servant. Such indignity should be resented by every right-feeling man.

It is a misfortune that the large majority of hospitals have no physicians among their directors. Hospital management is often extravagant and wasteful, due to official influence in furnishing comfortable berths for incompetent relatives or unfortunate friends in some salaried executive position.

Fortunately, the list of grievances is not large and I believe that they can be harmoniously adjusted if taken up with the proper authorities in a conciliatory spirit. Our first object must be to see that no poor person shall be subjected to the slightest inconvenience or annoyance and that every worthy charity shall have our united support; but we must look to it that the charitable practitioner's time, knowledge and skill shall not be misused.

THE PRACTISE OF MEDICINE AS A BUSINESS.

It is a hard matter to adjust the financial side of the practise of medicine; that doctors are poor collectors and bad investors is a notorious fact and makes them the easy prey of the various investment 'gold bricks.' A physician owes it to himself, to his family, to his profession and especially to the community at large, to manage his finances well. Otherwise he can not pursue his studies and give to the sick his best efforts which they have a right to expect and demand. No sensible man enters upon a medical career with a view of making money. I have never known a physician who has become rich solely from this source, and it is better so; for beyond that reasonable competence which leaves him free to pursue his life work, the care of money interferes with the highest aims

of the true physician and few who have been burdened with wealth have reached their ideal in a calling which makes no distinction between the rich and the poor.

One of the demoralizing tendencies in this commercial age is the money standard of success. Physicians are not called or chosen; accident or environment brings about their choice of a profession. While professional life broadens the mental horizon and increases sympathy it can not change man's nature, and men who are unfair in business affairs are to be found in our midst.

The one crying evil, which fortunately is not widespread, is the giving of commissions, in other words, the selling of the confidence which the patient has in his practitioner to some specialist who will divide the fee in return for reference of the case. The one secretly takes money from the patient without his consent, and the other, in order to complete the bargain, charges more than he should. This is equally harmful to the one who receives and to the one who gives. Such matters can not be kept secret and I have personal knowledge of men of good attainments and remunerative practise who have been ruined through losing the confidence of their communities by this pernicious traffic. Some attempts have been made to justify it, but the very fact that it is secret shows that both parties are ashamed to have it known and is an acknowledgment of its moral obliquity.

Our relations with the allied profession of pharmacy are not on as ethical a footing as they were twenty years ago. Then the druggist was the faithful friend of the physician. To-day in putting up from fifty to sixty per cent. of the prescriptions sent to him, the educated pharmacist cannot use his skill as a chemist but simply acts as a distributor of copyrighted preparations which the physician calls for a few times only to take up with something new and leave the shelves of the druggist filled with the unused remnants.

Many physicians compound their own prescriptions to the detriment of the pharmacist. The proprietary medicine people have managed this very cleverly; to the physician they are continuously calling out that the druggist is 'substituting'; with one hand they have given the physician remedies to dispense himself, and with the other furnished the druggist with patent medicines with which to compete with the physician, and these two natural allies have drifted apart. The average pharmacist can not live on physicians' prescriptions alone, but he should be treated justly, and both physician and druggist would profit by mutual concessions to the great benefit of the public.

The higher grade of pharmaceutical houses already see the danger to honest pharmacy in the forced promotion of 'ethical' and fake nostrums under catchy names, and it is to be hoped in the future, will confine themselves to the open compounding of legitimate preparations; and these and these only should be found on the advertising pages of reputable medical journals.

MEDICAL PROGRESS.

Graduation from college is merely a commencement of a life study of medicine. Therefore young men without special training under competent teachers should not be encouraged in wanton assaults on major surgical diseases unless justified by necessity. The future will demand schools for advanced training for those who desire to do special work.

The recent graduate in medicine should begin in his county society by contributions to the newer methods which will be interesting to the older men. This should be his kindergarten; from there he will carry his papers to the district meetings;

and at the end of five years he will be competent to bring useful material to the state society and later to the sections of the American Medical Association.

In the practise of medicine the student days are never over. There is so much to be learned that a long and industrious life leaves one with the feeling that he is but a beginner. The most important habit a young man can form is the 'daily study habit.' Let him put in even one hour a day with the reading of journals and books of reference and much can be accomplished. He should keep an account of the time and if something interferes for a day he should charge himself up with it. A two weeks' vacation means fourteen hours to be made up. Most men can do more and no man has a right to do less, no matter how busy he may be. The leaders in our profession make a daily average of three or four times this amount of study the year round in addition to the demands of an active practice.

The practitioner must make frequent trips away for the purpose of observation. In no other way can he avoid the rut of self-satisfied content which checks advancement and limits usefulness. No amount of diligence as a student can take the place of personal contact with men in this same line of work.

What are the rewards of so laborious a life? They can not be measured because there is no standard of comparison. To realize that one has devoted himself to the most holy of all callings—that without thought of reward he has alleviated the sufferings of the sick and added to the length and usefulness of human life, is a source of satisfaction money can not buy. I know many a man grown gray in the profession with little of a tangible nature to show as a result of his work, but who is not only contented with his lot but proud to have served in the ranks, and who looks back upon a life of privation and hardship for the benefit of humanity as a privilege which he is thankful has been vouchsafed him.

Let us continue to strive as individuals for the honor and dignity of our profession. In this we but follow out the aims and ideals of those who have gone before and prepared the way. But the great movements of the future can not be brought about by individual action. They must be initiated and controlled by united effort, and in no other way can the epoch-marking truths of preventive medicine be made to bear fruit. Unity is the spirit of the times; it marks the difference between the old and the new.

The vital need of the medical profession is a harmonious organization—an organization that will encourage right thinking and good usage among ourselves, help to secure needed medical reforms, compel redress of grievances and promote and encourage the highest interests of its individual members: and in this lies the future usefulness of the profession as a whole.

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THE KEEPING OF TOBACCO.[1]

The smoking quality of cigars and tobaccos depends in a large measure on their physical condition, the moisture condition being an important factor. A green, unseasoned cigar does not develop that peculiar aroma which is the delight of all fastidious smokers, and a cigar which has been allowed to become too dry burns too rapidly, most of the aroma being lost in the rapid combustion. Every manufacturer or dealer aims to bring his stock into exactly the right moisture condition and then to maintain it in that condition.

The public taste for cigars varies in different localities and countries and in all

[1] Published by permission of the Secretary of Agriculture.

the large factories cigars are conditioned to suit the demands of the country to which they are to be sent. In Europe, more especially in the British Isles, the consumer of cigars requires that they should be dry, in fact, almost brittle. It is a common incident in that country to see a smoker take his cigar and place it to his ear to see if it will give forth a cracking sound; and if it does not crackle the cigar is considered too moist. Pipe smoking tobaccos, however, are required very moist. In the United States the proper condition for cigars and pipe smoking tobaccos is just the reverse. The American smoker requires his cigars in such a condition that the wrapper, binder and filler will yield to the pressure of the fingers without cracking or breaking the wrapper; while on the other hand the smoking tobaccos, especially the granulated tobaccos, must be moderately dry.

Various methods are employed for keeping cigars and tobaccos in the proper condition, but up to the present time no method has been devised that will act automatically. Both manufactured tobacco and cigars are susceptible to climatic conditions, and it requires the constant attention of the manufacturer and dealer to regulate the moisture in his stock cupboard or show case. In retail stores great trouble is experienced in keeping the air in the show cases in the proper condition, especially when these are constantly being opened. In warm, wet weather more moisture is admitted than is needed, while during the cold winter months the cigars are apt to become too dry, especially in the upper part of the show cases.

Until recent years the common practise was to have a tray fitted with felt pads moistened with water placed in the top of the cupboard. This proved rather unsatisfactory, as evaporation took place too rapidly and the pads required constant moistening, especially during the winter months. These felt pads have given way to a large extent to asbestos wool which, when saturated with water, conserves the moisture for a much longer period. The constant opening and closing of show cases causes a constant replacement of the air in the case by the outside air. When the outside air is moist, as during wet weather, the pads have to be removed from the cases, for otherwise the air would become too moist. When the outside air is dry, the pads are used in the cases to compensate for the moisture lost at every opening of the case.

Several mechanical devices for regulating the proper amount of moisture in a cigar vault or stock room have been placed on the market, the principle of most of these being to drive a current of air over a vessel of water or damp pad either of felt or asbestos, thereby circulating a current of moist air in the room. Another device has been to spray water into the surrounding air. Both these devices are subject to the same objection as the use of damp pads, namely, that they do not automatically control under all climatic conditions the moisture content of the atmosphere with which the cigars or tobaccos are in contact.

As the present methods for the keeping of cigars and tobaccos in the proper condition of moisture are at best haphazard and as the aroma of a cigar depends to a very great extent upon the degree of dampness, a more precise method was sought, which should automatically maintain the proper degree of humidity of the air with which the cigars or tobaccos are in contact. It was with the object of determining what percentage of moisture in the air would be the best for the required purpose that these experiments were undertaken, or, using more technical language, the vapor pressure was sought at which the cigars or tobaccos maintained their proper physical properties.

It is a principle of physical chemistry that everything, even the most infusible of metals, has a vapor pressure, although this is so small as to be negligible in some cases. In other words, every object tends to keep the air space around it saturated with the vapor of that object. Thus, a body of water will continually evaporate into the air if the air be unsaturated with water vapor at that temperature, and conversely when the air becomes saturated with water vapor and then is cooled for any reason, precipitation ensues as cold saturated air contains less water vapor than warm saturated air. This vapor pressure of water is a perfectly definite quantity at any temperature, the pressure of the water vapor, or percentage of water vapor in the air, being greater at high temperatures than at lower temperatures. A solution of a solid in water has also a perfectly definite pressure, the more concentrated the solution the lower being the pressure. If for any reason the quantity of water vapor is greater than that with which the solution can exist in equilibrium, the solution gains in weight due to the condensation of the excess of water vapor from the air, and thereby becomes more dilute, and will continue to become more dilute until equilibrium is established between the solution and the vapor. Thus, if a beaker containing a dilute solution of sugar, and a beaker containing a more concentrated solution of sugar be placed under a bell-jar, the dilute solution tends to maintain a greater moisture content in the air space than does the more concentrated solution. Consequently there is a slow continual evaporation from the dilute solution to the more concentrated one, and this process will continue until the vapor pressure of the two solutions becomes identical, that is, until the percentage composition of the solutions is the same. In like manner, if the beakers contain solutions of salt and sugar, respectively, of unequal vapor pressures, there will be a distillation from the solution of higher vapor pressure to that of lower vapor pressure, the distillation continuing until the two solutions have acquired equal vapor pressures. In like manner, salts containing water of crystallization have definite vapor pressures depending on the temperature. If the vapor content of the gaseous phase falls below this vapor pressure, the hydrated salt gives up vapor sufficient to restore that vapor pressure, some of the anhydrous salt, or of a salt of a lower degree of hydration, being formed. If the content of the gaseous phase increases for any reason above the vapor pressure of the hydrated salt, there is no change until the vapor pressure of the saturated solution of the salt is reached, at which point the salt deliquesces, or becomes damp, due to the formation of a film of the saturated solution on the surface of the crystals. The saturated solution of magnesium chloride ($MgCl_2.6H_2O$) has a lower vapor pressure than the pressure of the water vapor ordinarily present in the air about us. Consequently, when the crystals of this salt are exposed they soon become moist and if left long enough they will dissolve completely in the water which has been condensed from the air. A hydrated salt, which is not deliquescent, will prevent the vapor pressure from diminishing below a certain amount, but will not prevent it exceeding that same amount. The vapor pressure of water in capillary openings differs very greatly from that at a free surface, and so porous substances, like paper and textiles, will hold water even when the vapor pressure of the air is below that of water at a free surface.

The moisture absorbed from a damp atmosphere by tobacco may form a solution with the salts present, it may form hy-

drated salts, it may be held by capillary forces in the leaf, or it may be in all three conditions. This question of the condition of the moisture in tobacco will not be discussed in this paper. That tobacco may be considered to have a 'vapor pressure' may be safely assumed from every-day experience, for if it is kept in a dry atmosphere it dries, and if in a moist atmosphere it becomes moist. The object of this investigation was to determine the magnitude of this vapor pressure. When this had been determined the next step was to find some material which would automatically maintain that vapor pressure.

Over two years ago the following experiments were conducted by the author under the direction of Professor Wilder D. Bancroft, of Cornell University. A plug cut tobacco (Old Gold) was used and the object of the first experiments was to find under what conditions the weight of the tobacco would remain the same as when the box was first opened. As the vapor pressure of sulphuric acid solutions had been determined quite accurately and over a great range of concentrations, solutions of sulphuric acid were employed in the tests. A number of solutions were prepared having densities varying from 1.24 to 1.38, and a large quantity of each (about 300 c.c.) was used so as to avoid material changes in composition. It was already known that the vapor pressure of tobacco probably lay between the vapor pressure of the two end solutions. These solutions were put into desiccators, such as are used in chemical laboratories, and the tobacco was placed on a watch glass which rested on a wire tripod, which in turn rested upon the shoulder of the desiccator. The weight of each sample of tobacco had previously been determined by weighing on the tared watch glass. After standing for two weeks in the closed desiccator the watch glass and the samples of tobacco were again weighed. Approximately the same quantities of tobacco were used in each desiccator, so that the surface exposed should be nearly the same throughout.

The samples of tobacco, which stood over solutions which tended to maintain in the air a greater percentage of moisture than the tobacco, would gain in weight, and on the contrary the solutions having the less vapor pressure than the tobacco would cause the tobacco to lose in weight. Also, the greater the difference between these pressures the faster would the loss or gain occur. The following are the results of this set of experiments:

TABLE I.

Change in the weight of plug-cut tobacco standing over sulphuric acid solutions of different strengths.

No.	Specific Gravity of H_2SO_4.	Initial Weight of Tobacco.	Weight After Two Weeks.	Per Cent. Loss or Gain in Weight.
1	1.376	2.4016	2.2630	5.76 loss
2	1.354	2.4070	2.2844	5.01 "
3	1.325	2.0810	2.0162	3.11 "
4	1.296	2.5570	2.5290	1.09 "
5	1.283	2.6730	2.6802	0.27 gain.
6	1.272	2.7264	2.7568	1.12 "
7	1.250	2.2100	2.2856	3.43 "
8	1.237	2.6170	2.7414	4.74 "
9	No liquid present.	2.3004	2.2908	0.42 loss.

In the accompanying figure (1) the per cent. loss or gain in weight has been plotted

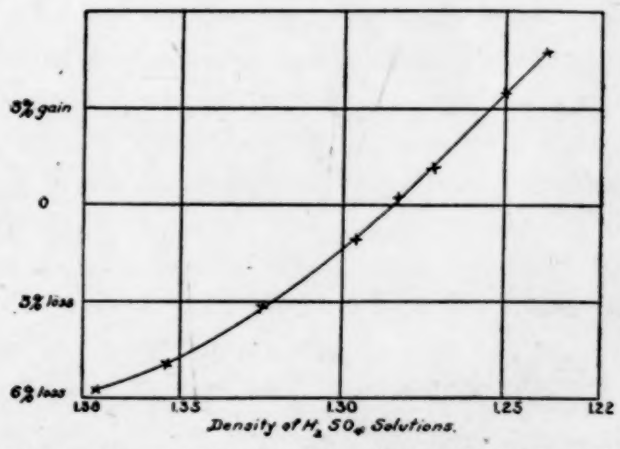

FIG. 1. Showing the loss or gain in weight in (Old Gold) plug cut tobacco after two weeks.

against the density of the acid solution. Both the table and the diagram indicate that the solution of sulphuric acid which would be best for keeping that particular tobacco in the condition in which it is put on the market, has a density lying between 1.283 and 1.296, rather nearer the former figure than the latter. Reading from the curve, the solution which causes no loss or gain in the weight of the tobacco has a density of 1.285.

No precautions were taken in the above experiment to control the temperature, and I have assumed that the temperature was 20° C., which is very close to the mean temperature of the laboratory at that season. The vapor pressures of solutions of sulphuric acid at different temperatures have been determined by Richards[2] and from his tables, the solution of sulphuric acid, having a density of 1.285, has a vapor pressure of 10.8 mm. at 20° C. The result of the experiment has been to show that for that particular tobacco a solution having a vapor pressure at 20° of 10.8 mm. will keep that tobacco (Old Gold plug cut) in the same condition of moisture as it had when the box was opened.

Now there is no automatic method of regulation of the composition of this solution, and so some method for this regulation had to be found. Here the principles of physical chemistry suggested the use of a saturated solution of some salt, which solution must have the proper vapor pressure. A saturated solution automatically controls the vapor content of the air space above it, for if the vapor pressure is above that of the solution, there is condensation tending to dilute the solution; but, as there is already solid salt present in the solution, it goes into solution until saturation is again reached. Conversely, if the vapor pressure of the air space is below that of the solution, there is evaporation from the surface of the solution, causing some of the salt to crystallize out. Thus a saturated solution containing some of the crystals of the salt is a means of preserving a constant vapor pressure in a confined space. A dry tobacco will absorb water and a very moist tobacco will lose water, the salt solution acting as a control.

There is, of course, this requirement to be filled, that the solid shall not itself evaporate and give any unpleasant taste or odor to the tobacco, such requirement being filled by almost any inorganic salt. From the measurements of Lescoeur[3] the following vapor pressures of solutions saturated at 20° have been taken:

Table II.

Vapor pressure of saturated solutions of various salts at 20°.

Salt.	Vapor Pressure of Saturated Solution at 20°.
Potassium iodide	11.2
Sodium sulphate	12.0
Sodium acetate	11.3
Barium bromide	10.7
Cadmium bromide	10.0
Manganese sulphate	11.3
Sodium nitrate	11.15
Cadmium nitrate	10.0

The saturated solution of barium bromide has a vapor pressure very nearly equal to that which was found for the tobacco, and Lescoeur's results also show that the solid salt ($BaBr_2.2H_2O$) has practically the same vapor pressure. Professor Bancroft has kept cigars for a long time in a desiccator containing barium bromide with very good results. This procedure has another advantage, for it not only keeps cigars and tobacco in good condition, but it may also be used to bring to a proper moisture condition, tobacco and cigars

[2] *Proc. Am. Acad.*, **33**, 23 (1897–98).

[3] *Ann. Chim. Phys.* (6), **16**, 378; **19**, 35, 533; **21**, 511; **25**, 423; **28**, 237; (7) **2**, 78; **4**, 213; **7**, 416; **9**, 557.

which have become dry and also those which are too moist for consumption. Mr. E. S. Shepherd, formerly of Cornell University, has successfully used this method to bring to a proper degree of moisture some cigars which had become thoroughly dried out. Similar results have been obtained in this laboratory. A box about three feet long, eighteen inches high, and twelve inches deep was provided with three shelves made of slats, so as to allow free circulation of the air inside the box. Several large evaporating dishes, each containing a saturated solution of sodium nitrate, and also an open box of cigars, which had become thoroughly dried out, were placed in this larger box. After a couple of weeks the cigars were examined and were pronounced by Mr. McNess, who is in charge of the tobacco investigations of this Bureau, as well as a number of others, to be in prime condition. The vapor pressure of saturated sodium nitrate solution is slightly greater than that of the barium bromide solution and will, therefore, keep the cigars rather moister than the latter solution.

By the use of solutions other than those which have been employed, the cigars may be made drier or moister, depending upon the solution employed. In this way the individual tastes of the consumer may be satisfied, some people preferring quite moist tobacco and others preferring it quite dry. By the proper choice of the solution, any degree of moisture in the tobacco may be attained and maintained. The use of solutions containing more than one salt offers possibilities of all gradations between a very wet and a very dry tobacco.

Experiments have been carried out in this laboratory using cigar wrapper, binder and filler tobaccos. Of course, the moisture content of these tobaccos in the proper condition for manufacture is different from that when the cigars are in proper condition for consumption. The object of these experiments has been to determine the proper condition under which the different cigar tobaccos must be kept preparatory to manufacture. A series of four desiccators contained different strengths of sulphuric acid and weighed samples of each

TABLE III.

Change in weight and condition of cigar filler tobacco.

Density of Acid.	Initial Weight of Tobacco.	Weight of Tobacco After 17 Days.	Per Cent. Change in Weight.	Condition.
1.0555	40.96 gm.	45.07 gm.	+10.0	Slightly water-stained, very slightly mouldy.
1.1190	38.53 "	39.43 "	+ 2.3	Fair condition.
1.1795	39.44 "	38.91 "	− 1.3	Good condition, no damage.
1.2445	46.49 "	41.43 "	−10.9	Too dry.

TABLE IV.

Change in weight and condition of cigar binder tobacco.

Density of Acid.	Initial Weight of Tobacco.	Weight of Tobacco After 17 Days.	Per Cent. Change in Weight.	Condition.
1.0555	18.43 gm.	20.17 gm.	+ 9.4	Mouldy on mid-rib, leaf tender.
1.1190	11.75 "	11.96 "	+ 1.8	Good condition, no damage.
1.1795	11.01 "	10.74 "	− 2.5	Slightly dry.
1.2445	15.53 "	13.83 "	−10.9	Entirely too dry

TABLE V.

Change in weight and condition of cigar wrapper tobacco.

Density of Acid.	Initial Weight of Tobacco.	Weight of Tobacco After 17 Days.	Per Cent. Change in Weight.	Condition.
1.0555	10.22 gm.	11.53 gm.	+12.8	Water-stained.
1.1190	13.95 "	14.87 "	+ 6.6	Slightly water-stained and slight white mould.
1.1795	10.61 "	10.49 "	− 1.2	Good condition, no damage.
1.2445	7.95 "	7.12 "	−10.4	Too dry.

kind of tobacco which were originally in fair condition were placed in each desiccator. After eighteen days the samples were again weighed, and the condition of the tobacco was carefully examined. The tables give the results of these experiments.

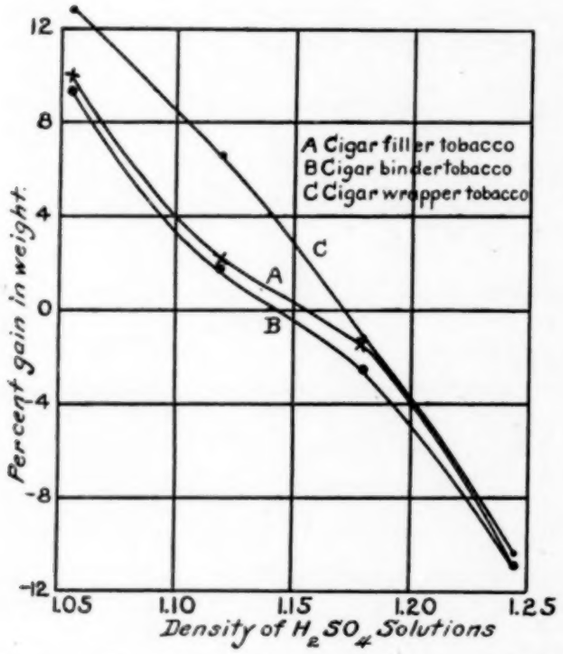

Fig. 2. Showing the loss or gain in weight in various cigar tobaccos.

From the above tables and Fig. 2 it will be seen that the *filler* and *wrapper* tobaccos are brought to a good physical condition by acquiring the same vapor pressure as a sulphuric acid solution of density about 1.18. The *binder* tobacco requires a somewhat weaker solution, 1.12. From the tables of Richards[4] for the vapor pressure of sulphuric acid solutions at 20°, the vapor pressure of a solution of density 1.16 is 15 mm. and of a solution of density 1.31 is 10 mm. A solution of sulphuric acid of density 1.18 has a vapor pressure of about 14 mm., while a solution of density 1.12 has a vapor pressure of about 16 mm. A solution of density 1.16 would probably keep all three kinds of tobacco in good condition. Lescoeur's results[5] have been consulted to find saturated solutions which yield vapor pressures at 20° in the neighborhood of 15 mm. The following table gives these figures.

Table VI.

Vapor pressure of saturated solutions of various salts at 20°.

Salt.	Vapor Pressure of Saturated Solution at 20°.
Potassium sulphate	14.4 mm.
Ammonium sulphate	14.8
Potassium nitrate	15.0
Zinc sulphate	15.3
Copper sulphate	15.2
Sodium sulphate	15.7

Of the above salts, zinc and copper sulphate are ruled out on account of their toxic action, if by any accident the salt should come in contact with the tobacco. Sodium sulphate has a rather high vapor pressure and is, therefore, best suited for the binder tobacco, while potassium sulphate with a vapor pressure below 15 mm. is best suited for filler and wrapper tobaccos. The best salts for all three are probably ammonium sulphate and potassium nitrate. Saturated solutions of ammonium sulphate have been used in the box which has been described and samples of the three cigar tobaccos which were very dry were placed on the shelves. At the end of ten days these tobaccos were pronounced by Mr. McNess, of this Bureau, to be in prime condition.

Thus, to bring cigar tobaccos into a proper condition of moisture preparatory to manufacture it is sufficient to place these tobaccos in a confined space in which there is exposed a large surface of a saturated solution of ammonium sulphate or potassium nitrate. After the cigars have been made up, they may be brought to a proper condition of moisture for consump-

[4] *Loc. cit.*

[5] *Loc. cit.*

tion by placing them in a confined space in which there is exposed a large surface of a saturated solution of sodium nitrate.

The following table gives the results of experiments upon Virginia fire-cured tobacco using the same solutions as had been used for the experiments upon cigar tobaccos.

TABLE VII.

Change in weight and condition of Virginia fire-cured tobacco.

Density of Acid.	Initial Weight of Tobacco.	Weight of Tobacco After 17 Days.	Per Cent. Change in Weight.	Condition.
1.0555	42.21 gm.	48.78 gm.	+15.6	Mid-rib very mouldy, leaf tender and covered with green mould.
1.1190	45.26 "	48.06 "	+ 6.2	Very mouldy and water-stained, leaf tender.
1.1795	42.63 "	43.29 "	+ 1.6	Less mouldy than above sample, but water-stained and tender.
1.2445	37.45 "	32.27 "	—13.9	Good condition, no damage.

Originally this tobacco was in a very wet condition and it was expected that the sample in the best condition would suffer a great loss in weight, and this is actually what happened. The atmosphere in contact with this tobacco must be very much drier than that in contact with any of the cigar tobaccos, and the solution which preserves this tobacco in good condition is a little less concentrated than the acid which kept (Old Gold) plug-cut tobacco in the same condition as it was when taken from the box.

It will be observed that different tobaccos require vastly different treatments to bring them to the proper moisture condition for manufacture or consumption. This work, however, brings out certain generalizations. All cigar tobaccos, whether filler, wrapper or binder, previous to manufacture require, within certain limits, very much the same treatment, *i. e.*, they are brought to the proper physical condition for manufacture by remaining a few days in an atmosphere which has acquired the concentration of water vapor, which is given off by a saturated solution of ammonium sulphate or of potassium nitrate. The second generalization is that all tobaccos, whether cigar or pipe, can be brought into proper physical condition for consumption by remaining a few days in an atmosphere which has acquired the concentration of water vapor given off by a saturated solution of sodium nitrate or some salt whose saturated solution gives approximately the same vapor pressure.

The principles enunciated in this paper might also be employed for the keeping of paper and other absorbent materials whose physical condition is affected by humidity.

SUMMARY.

1. It has been pointed out that the present methods for keeping tobaccos in proper condition for use, and for bringing them to the proper condition are haphazard and unsatisfactory.

2. Solutions have been found which keep tobaccos in the required condition for manufacture and use. This method is automatic, for the composition of a solution, containing some of the solid salt, does not change upon evaporation or condensation of moisture, until all the water has evaporated from the solution, or until all the solid has been dissolved by condensed moisture. The solutions which have been proposed will not only preserve a proper degree of moisture, but will also bring wet or dry tobaccos into a proper moisture condition. The solutions which have been proposed are quite inexpensive.

3. Practical tests have been made of the

proposed solutions upon wet and dry tobaccos, always with satisfactory results.

JAMES M. BELL.

BUREAU OF SOILS,
U. S. DEPARTMENT OF AGRICULTURE,
WASHINGTON, D. C.

SCIENTIFIC BOOKS.

Sur le développment de l'analyse et ses rapports avec diverses sciences. By EMILE PICARD. Paris, Gauthier-Villars. 1905.

In this little volume of 167 pages Professor Picard has republished the lectures which he came to America to deliver at the decennial celebration of Clark University in 1899 and at the St. Louis Congress of Arts and Science in 1904. The book thus has a special interest for American readers, but quite apart from this it will prove stimulating to all lovers of mathematics who feel the need from time to time of taking comprehensive views of the great divisions of their subject under the guidance of a master.

Parts of these lectures give information of a general character concerning some of the most recent advances in such subjects as the theory of differential equations and of algebraic functions of two variables, in both of which fields M. Picard is one of the leading workers. These sections, which necessarily presuppose a considerable mathematical training on the part of the reader, have been brought down to date by footnotes added since the lectures were delivered. They would be even more useful than they are if provided with more precise bibliographical references. Other sections will be found accessible to readers of much less mathematical attainment, and we can not indicate the kind of inspiration and enjoyment to be derived from them better than by giving a few typical quotations.

Without wishing to generalize too much, it may be said that mistakes are sometimes useful, and that during really creative periods an incomplete or approximate truth may be more fruitful than the same truth accompanied by the necessary restrictions (p. 5).

After having explained that it is not always wise to restrict one's attention to analytic functions (that is to functions which may be developed by Taylor's theorem) in spite of the fact that these functions are in a certain sense sufficiently general for all 'practical' purposes and that their theory forms an elegant mathematical system complete in itself, the author goes on:

In general, let us admire highly systematized theories, but let us distrust a little their scholastic appearance which is in danger of stifling the inventive impulse (p. 30).

In speaking of the development of mechanics in the eighteenth century the author says:

Formal mathematical developments played at that time the main part; and the language of analysis was indispensable for the greatest development of these principles. There are moments in the history of science, and perhaps of society, when the mind is upheld and carried forward by the words and symbols which it has created, and when generalizations present themselves with the least effort (p. 131).

True rigor is fruitful, and is thereby distinguished from another kind of rigor, purely formal and tiresome, which casts a shadow on the problems which it touches (p. 148).

Those who had the privilege of hearing M. Picard when he was in America will miss from this volume only the charm of the spoken word, while finding there all the attractive qualities of style for which the author is so justly noted.

MAXIME BÔCHER.

HARVARD UNIVERSITY.

SCIENTIFIC JOURNALS AND ARTICLES.

THE May number of the *Botanical Gazette* contains the following papers: A. D. E. Elmer contributes his third paper on 'New and Noteworthy Western Plants,' describing numerous new species from California; J. Y. Bergen discusses certain strand plants about the Bay of Naples, chiefly in reference to the toxic effect of sodium chloride, and shows wide variation in this regard; H. D. House describes with the help of illustrations new and noteworthy North American species of clover; Charles E. Lewis describes the basidium of *Amanita bisporigera*, having traced the nuclear divisions in connection with spore-formation. The number closes with the usual full review of current literature.

SOCIETIES AND ACADEMIES.

THE AMERICAN PHYSICAL SOCIETY.

THE spring meeting of the Physical Society was held at Washington, D. C., on Friday, April 20, and Saturday, April 21, 1906. President Barus presided.

The Friday session was held at the Cosmos Club, and the Saturday sessions at the National Bureau of Standards.

On Saturday afternoon Professor H. A. Lorentz, of Leyden, addressed the society on the subject of 'Gibbs's Statistical Mechanics.'

The program was as follows:

C. B. THWING: 'Measurements of the Internal Temperatures of Common Materials.'

J. G. COFFIN: 'On the Influence of Frequency upon the Self-inductance of Cylindrical Coils of Any Number of Layers.' (Read by title.)

E. B. ROSA: 'On the Geometric Mean Distance of Square Areas and their Use in the Calculation of Inductances.'

L. A. BAUER: 'Cheltenham Magnetic Observatory Registration of Effects from Electric Cars over Twelve Miles Distant.'

E. B. ROSA and F. W. GROVER: 'Mica Condensers as Standards of Capacity.'

L. W. AUSTIN: 'The Electrolytic Wave Detector.'

C. W. WAIDNER and G. K. BURGESS: 'On the Determination of Melting Points by Radiation Methods.'

E. P. HYDE: 'Talbot's Law as Applied to the Rotating Sectored Disk.'

H. B. BROOKS: 'A New Potentiometer.'

F. A. WOLFF: 'Direct Reading Methods for Resistance Comparisons.'

S. J. ALLEN: 'The Velocity and Ratio e/m for the Primary and Secondary Rays of Radium.'

A. H. PFUND: "New 'Reststrahlen.'"

A. H. PFUND: 'Study of Polarization Phenomena in the Infra-red.'

W. W. COBLENTZ: 'Note on a New Form of Radiometer.'

R. W. WOOD: 'Fish-eye Views.'

R. W. WOOD: 'Interference Colors of Chlorate of Potash Laminæ.'

R. W. WOOD: 'Fluorescence and Magnetic Rotation of Vapors.'

R. W. WOOD: 'Resonance Radiation of Fluorescence of Sodium Vapor.'

E. B. ROSA and N. E. DORSEY: 'The Ratio of the Electromagnetic and Electrostatic Units.'

F. J. BATES: 'Spectral Lines as Light Sources in Polariscopic Measurements.'

W. W. COBLENTZ: 'Water of Crystallization and Water of Constitution.'

E. RUTHERFORD: 'Distribution of the Intensity of Radiation from Radioactive Substances.'

L. E. WOODMAN and H. W. WEBB: 'The Dispersion of Electric Waves.'

C. W. CHAMBERLAIN: 'Note on the Compound Interferometer.'

W. P. WHITE: 'The Constancy of Platinum Thermo-elements and other Thermo-element Problems.'

W. P. WHITE: 'Some Properties of Moving Coil Galvanometers.'

The next meeting of the society will be at Ithaca, N. Y., June 28 to July 3, in connection with the summer meeting of the American Association.

ERNEST MERRITT,
Secretary.

THE BIOLOGICAL SOCIETY OF WASHINGTON.

THE 415th meeting was held on March 31, 1906, Vice-president Palmer in the chair and twenty-nine persons present.

Dr. Ch. Wardell Stiles offered the first paper, 'A Plan to Insure the Establishment of Type Species of Genera.' He exhibited various sections of the card catalogue on medical and veterinary zoology, and explained the system adopted of using different colored cards to aid the memory in systematic zoology, nomenclature and geographic distribution.

He also explained a proposition he is now submitting to various organizations in order to insure the designation of type species for new genera. This proposition involves the adoption of a rule by publishing organizations to the effect that no papers containing new generic names will be accepted for publication unless the author designates the type species for every new generic name used. It was adopted independently by the Washington Biological Society, which was the first organization to set up the rule.

In reply to a question, Dr. Stiles stated in reference to Ashmead's genera described in keys and citing a type species that, even in the absence of any separate specific description, he considered these genera as valid; the case is

identical with those numerous cases in which authors describe a new genus based upon a specific description, without separate generic diagnosis, but headed *X-us albus* new genus, new species.

In reply to a question relative to the correct date of a genus based upon a generic description, but without accompanying specific name or specific description, he stated that he considered the date of publication of said genus the correct date. He saw no difficulty in taking a later specific name as type of an earlier generic name; such action is common, for instance, in case of renamed species, and no confusion arises therefrom. Thus, *lanceatum* (1896) is *lanceolatum* (1803) renamed, and is type of *Dicrocœlium* (1845). In all cases, however, the species in question must have been included in the genus from the standpoint of the author of the genus. Another case in point is *Dioctophyme* (1802), which, as the illustrations and habitat show, was clearly based upon *renale* (1782), although *renale* was not mentioned by name.

In reference to the arrangement to be followed in publishing genera, he stated that as secretary of the International Commission he had been obliged to consult numerous articles by various authors in fields outside of his own specialty, and that he had found the plan proposed by Dr. Evermann and as adopted by President Jordan and his coworkers to be the most convenient of any arrangement he had seen. Only one improvement occurred to him, namely, to give a reference to the family in connection with every generic diagnosis. He suggested the following as an ideal plan which would enable any author to comprehend the writings on groups with which he was not thoroughly familiar and as aiding the indexer in indexing the genera:

Equus Linnæus, 1758.

1758: *Equus* Linnæus, 1758, 73–74, Syst. nat., 10 ed. (type *caballus;* Eurasia); *equus* Latin, horse.

1815: *Caballus* Rafinesque, 1815, 55, Analyse de la Nature (*Equus* 1758 renamed, type *caballus*); *caballus* Latin, horse. *Generic diagnosis.*—Equidiæ (p. — [refer here to page of family diagnosis]): [write generic diagnosis here].

The object of this arrangement is to enable a zoologist who is not acquainted with the recognized systematic position of a genus or with any possible differences of opinion on this point, to find the information he desires in the shortest possible time.

Further, many authors do not give in their entire article any clue to the family, ordinal or even class disposition of the new genera they publish or their idea as to the position of old genera.

The family diagnosis should give a clue to the order in which the family is classified. If this arrangement were adopted, any author could begin with a species and trace its systematic position without the slightest difficulty.

Dr. B. W. Evermann urged the desirability of Dr. Stiles's scheme and read the following rules, which have been promulgated by the U. S. Bureau of Fisheries as requirements to be observed by authors submitting to the bureau papers containing names of new genera or species:

New Genera.

1. Designate the family in which the proposed new genus belongs.

2. Designate the species taken as the type of the new genus.

New Species.

3. A single specimen shall be designated as the type of the species.

4. Other specimens studied at the same time and believed to be conspecific with the type should be designated as cotypes.

5. The size and condition of the type, the museum in which it is deposited, and the number which it bears on the register of said museum shall be given.

6. The type locality, collector and date of collecting must be given.

The same rules apply to subgenera and subspecies.

The types of all new species first described in the publications of this bureau will, except in exceptional cases, be deposited in the U. S. National Museum.

The second paper was by Dr. Rodney H. True on 'The Cultivation of Tea in the United States,' and was illustrated with lan-

tern slides, and by samples of tea in both the rolled and tablet form.

Owing to the large and steady demand for tea in the United States, both the government and private parties have from time to time given more or less attention to the propagation of tea with reference to the possibility of bringing up an industry. The most serious attempt in this direction was begun by Dr. Charles U. Shepard, at Summerville, S. C., as a private enterprise some years since. This enterprise has been in part supported by the Department of Agriculture in cooperation with Dr. Shepard. Attention has been given not only to the cultivation of the plant under the conditions of the Carolinas, but also to the introduction where possible of machine methods. This has resulted in the invention of a number of very useful labor-saving devices, which have placed a large part of the work connected with the manufacture of tea on a machine basis, with a considerable consequent reduction of the cost of production. As a general outcome of the experiments during the last season, it may be stated that the crop amounted to about five and a half tons of high-grade tea, which has been satisfactorily disposed of through the usual channels of tea commerce.

Recently the broken tea-leaf has been most satisfactorily utilized in the form of tablets. The tea powder contains sufficient oily material to cement the mass under high pressure into firm tablets, which readily fall apart when treated with hot water. The compact form of the tablets does not interfere with the desirable qualities of the tea and makes a product which is proving very popular where compactness is desired.

The question of the commercial production of tea at this location seems to be in a fair way toward ultimate favorable solution. A number of important problems, however, still remain to be solved.

The Department of Agriculture has established another tea farm at Pierce, Texas, where about forty acres are now planted with young tea. Matters have not progressed far enough as yet to warrant any statement regarding the probable outcome of this feature of the experiment, beyond the mere statement that some small samples of tea made from the young bushes form a product of very high quality.

Laboratory studies at Washington and at Summerville, S. C., in connection with Dr. Shepard's work, have demonstrated some important scientific facts which have a distinct bearing on the tea industry. The process of fermentation, which produces a product characterized by the general qualities of so-called black tea, is due to oxidizing enzymes present in the tea leaf operating on other bodies present in the leaf, resulting in the development of compounds giving the characteristic color, taste and odor of the black tea. In green tea this fermentation process is prevented by the destruction of the oxidizing enzymes by the application of heat to the newly picked leaves. Further investigations, carried on in cooperation with Dr. Edward Kremers, of Madison, Wis., indicate that the aromatic qualities of the tea leaf are not due, as is currently believed, to preformed volatile oils found in the leaf, but to aromatic bodies developed in the tea leaf by the factory processes, particularly during the firing process.

M. C. MARSH,
Recording Secretary.

THE GEOLOGICAL SOCIETY OF WASHINGTON.

AT the 181st meeting of the society on May 9, the following papers were read:

Normal Faulting in Northern China: Mr. BAILEY WILLIS.

A Type of Vein Structure in the Southern Appalachians: Mr. L. C. GRATON.

Two Occurrences of Graphite: Mr. GEO. OTIS SMITH.

Mr. Smith described two occurrences of graphite in western Maine which had been visited by him in 1905. These illustrate two modes of origin and the genetic relationships have a direct bearing upon the question of economic value of the deposits.

At Madrid, the graphite occurs locally in schist at the contact with irregular bodies of pegmatite. Some of the schist beds are rela-

tively barren and this variation in graphite content is believed to express the original difference in percentage of carbon in the sediments. The graphite grains are minute and intimately associated with muscovite and quartz. The Madrid graphite is regarded as the product of the conversion and concentration of carbonaceous particles of sedimentary origin through the agency of heated vapors from the pegmatite magma.

In Yarmouth, the graphite is found within a pegmatite dike which cuts a large granite mass. The graphite in flakes and large masses is a well-distributed constituent of the pegmatite, and with the quartz and feldspar forms the usual mosaic. No evidence was noted of any source of the carbon of the graphite other than in the molten rock which intruded the granite itself, the graphite being as much an essential and original constituent of the pegmatite as is the quartz or the feldspar.

Copper Deposits of the Zuñi Mountains, New Mexico: Mr. F. C. Schrader.

The Zuñi Mountains form a group about twenty miles long and fifty miles wide, situated some eighty-five miles west of Albuquerque. They are composed of pre-Cambrian schists, gneisses and granites, and are flanked on all sides by gently upturned strata regarded as of upper Carboniferous age — the 'red beds' of the Colorado Plateau region. Mount Sedgewick, the highest summit of the group, rising 2,000 feet above the surrounding plateau, reaches an elevation of 9,200 feet. The topography is for the most part not rugged and nearly every portion of the district may be reached by wagons. The drainage goes to the Rio Grande by way of the Blue Water and San Jose rivers on the north, and the Agua Fria on the south. The trend of the mountains and of the dominant structure in the pre-Cambrian rocks is a little north of west, and the foliation of the schists and gneisses dips steeply toward the south.

Copperton, the principal mining camp, is situated in the heart of the mountains about twenty miles west of the Atlantic and Pacific Trans-Continental Railway.

Copper deposits are found both in the pre-Cambrian rocks and in the lower strata of the 'red beds.' In both situations the ores thus far revealed consist almost entirely of secondary copper minerals including green and blue carbonates and copper glance. Chalcopyrite, though present, is uncommon.

In the Pre-Cambrian the ores occur along sheeted zones in the schists or gneisses, sometimes associated with quartz in irregular vein-like bodies, but to a greater extent disseminated through the rocks of the mineralized zones. These zones vary in width, the widest observed being 800 feet across. They are often persistent for considerable distances, and in several instances the presence of workable amounts of rock carrying above three per cent. metallic copper has been demonstrated. The usual minerals associated with these ores are quartz, specular iron, limonite, galena, and pyrite. Gold values are said to run from one dollar to four dollars per ton.

The basal strata of the 'red beds' which carry copper minerals are from thirty to sixty feet in thickness. At the bottom is an arkose conglomerate and above this there are layers of sandstone and shale. In the northwest part of the district the conglomerate may be seen resting upon the basset edges of the crystalline pre-Cambrian rocks. The ore minerals are locally disseminated through the rocks, and where occurring in the conglomerate appear to have been deposited with the sand and gravel which compose the rock. If this suggestion is correct, the copper minerals were probably derived by erosion from the pre-existing deposits in the crystalline formations. The ore-bearing strata, and especially the shaly beds, contain considerable amounts of fossil wood, and this material has been very largely replaced by copper carbonates and glance, and cuprefacts produced in this way form an important portion of the 'red bed' ores.

The district has been under development for about five years, but as yet there are no shipping mines. Annual assessment work is done on some 200 claims controlled by about 75 individuals. The region is well watered and forested, and the climate is a pleasant one.

AT a special meeting on the evening of May 18, the following illustrated papers were presented:

Epitome of the Geologic History of the California Coast Ranges: Mr. F. L. RANSOME.

Evidence of Geologically Recent Movements near San Francisco: Mr. GEO. H. ASHLEY.

Location and Character of the Faults in the Earthquake Region: Mr. RALPH ARNOLD.

Lantern views showing some effects of the earthquake: These views, sent by Messrs. G. K. Gilbert and W. C. Mendenhall, were exhibited by Mr. Ashley.

Seismograph and Magnetograph Records of the San Francisco Earthquake: Mr. L. A. BAUER.

Comparative Intensities of the New Madrid, Charleston and San Francisco Earthquakes: Mr. M. L. FULLER.

While all conclusions regarding the San Francisco shock must necessarily be provisional until the publication of accurate scientific data, sufficient evidence is at hand to warrent certain general conclusions as to its intensity as compared with the New Madrid earthquake which shook the Mississippi Valley in 1811–12 and the Charleston disturbance of 1886. Considering first the area affected by fissuring, we find such phenomena have been reported to extend at least 125 miles both north and south of San Francisco and throughout a belt 50 miles wide. At New Madrid the length of the disturbed area was 110 miles and the width about 60 miles, while at Charleston it was only 30 miles long and 20 miles broad. It should be noted, however, that at San Francisco the fissuring occurred only at widely separated points where the conditions were peculiarly favorable, while in the New Madrid and Charleston areas the entire surface within the limits mentioned was affected.

The main San Francisco shocks appear to have lasted only about one and one-fourth minutes, with slighter tremors for a few hours and occasional light shocks for several days. At Charleston the severe tremors were likewise confined to a few hours, but at New Madrid they continued at short intervals for over a year, nearly 2,000 shocks, 53 of which were severe, occurring in the first three months. The effect on buildings was also greatest at New Madrid, even low cabins being shaken down, but at Charleston relatively few of even the larger buildings were destroyed although many were injured. The destruction at San Francisco was somewhat greater, but the better class of buildings, especially the steel structures, generally escaped. The magnitude of the surface undulations was greater at Charleston than at San Francisco and greatest of all at New Madrid, in which region considerable areas of forest were thrown down even on the level ground, while the bluffs were literally shaken to pieces, the resulting landslides converting them into jumbles of earth heaps and tree trunks for a distance of 100 miles. Such landslides were absent at Charleston, but occurred occasionally at San Francisco, although much less frequent and conspicuous than at New Madrid.

Tidal waves were practically absent both at San Francisco and at Charleston, but at New Madrid the Mississippi was disturbed by great waves which destroyed much of the shipping and the current even retrogressed in certain localities. Cracks and craterlets, with possibly one or two exceptions, seem to have been absent in the San Francisco region, but were common at Charleston and New Madrid. In the former locality the cracks were usually less than an inch across, but in the latter were often many feet in diameter. Craterlets abounded in both localities, but both in the area covered and in number and amount of sand and water extruded, New Madrid stands first. The courses of the streams were little affected at San Francisco or Charleston, but in the New Madrid area the courses of many were changed, the water following new cracks instead of the old channels. Others were deflected by the warping of the surface, while still others were obstructed by faults or sharp folds giving rise to extensive marshes or large lakes of open water. In fact the New Madrid area seems to be the only one of the three in which the general level of the land was notably affected.

Various other lines of evidence all point to the same conclusion — that every type of earthquake phenomena was more pronounced in the earlier than in either of the more recent shocks. The destructiveness, owing to geologic conditions, was somewhat greater at San Francisco than at Charleston, although the actual intensity of the Charleston shock was greater.

The New Madrid earthquake is believed to have been due to faulting produced by local overloading of the crust by the Mississippi embayment deposits. Evidences of prehistoric shocks have been found and it is known that the readjustment is still in progress. Shocks are to be expected in the future which may be disastrous to the small towns near the Missouri-Arkansas line, if not to the cities of Memphis and Cairo, and possibly to St. Louis. The cause of the Charleston shock was probably similar to that at New Madrid, but there are no indications of earlier disturbances, and none of importance have occurred since 1886. The conditions at that point are not threatening. The San Francisco shock was due to the readjustment of one or more faults due to mountain-building forces which have long been in operation. Evidences may be seen of past disturbances far greater than the present, and, while possibly the present generation may have little to fear owing to the temporary equilibrium which has been established, there will almost certainly be as great or greater disturbances in the future as in the past.

Arthur C. Spencer,
Secretary.

THE PHILOSOPHICAL SOCIETY OF WASHINGTON.

The 619th meeting was held May 19, 1906, Vice-president Bauer in the chair.

Announcement was made of the election of ten new members.

Memorial papers were read on three deceased members, all connected with the Coast and Geodetic Survey: On Mr. H. G. Ogden and Mr. E. D. Preston, prepared by invitation by Mr. W. B. Chilton, and on Mr. F. M. Little, by Mr. L. P. Shidy. Further remarks and personal tributes were added by Messrs. Bauer, Hayford and Gore.

Several informal communications were then made:

Mr. Burbank had investigated the radioactive substance in the atmosphere and finds about twenty-five per cent. of it to be thorium.

Mr. Wead pointed out the similarity between the increase in wave-length of spectral lines in dense gases, found in Humphries's experiments, and that indicated by the ordinary formula for vibration with high damping, and suggested new experiments.

Mr. Hayford read a letter from M. Guilleaume, of the International Bureau, describing the recent measurement in the Simplon tunnel of a twenty-kilometer base-line in three days and nights, using his nickel-steel bars.

Mr. Rosa called attention to the two illogical terms in the table of lengths—the tenth-meter and $\mu\mu$; the logical series with ratio 1,000:1 would be:

$$km,\ m,\ mm,\ \mu,\ m\mu,\ \mu\mu.$$

The society then adjourned till October 13.

Charles K. Wead,
Secretary.

THE ST. LOUIS CHEMICAL SOCIETY.

At the meeting of the society on May 14, Mr. J. J. Kessler presented a paper entitled 'The Physical Structure of Metals and Alloys.' The speaker dwelt on the light shed on the mystery of alloys by physical chemistry and by microscopic examinations. The minute structure of a material can not be revealed by purely chemical examination, but it is revealed in the microscope. The speaker then explained the preparation of the surface for microscopic examination by polishing and etching. The paper was profusely illustrated by excellent slides made from microphotographs of all phases of structure of both pure metals and alloys.

C. J. Borgmeyer,
Corresponding Secretary.

COLORADO CONFERENCE OF SCIENCE WORKERS.

A state conference of science workers was held in Boulder at the University of Colorado on May 4 and 5, 1906. The program of the conference was as follows and all papers were presented by the authors.

G. L. CANNON: 'The Necessity for Science Conferences in Colorado.'

JUNIUS HENDERSON: 'The Collecting of Mollusks in Colorado.'

T. D. A. COCKERELL: 'The Fossil Beds of Florissant.'

A. E. BEARDSLEY: 'The Crustaceans of Colorado.'

H. E. SOVEREIGN: 'Apparatus illustrating the Laws of Electromagnetic Induction.'

A. N. FINN: 'A Report on the Quantitative Analysis of Uranium and Vanadium.'

J. ARTHUR BIRCHLEY: 'A Study of the Kater Pendulum.'

WM. DUANE: 'New Kinds of Radiation.'

G. S. DODDS: 'The Projection Microscope for Work in Botany and Zoology.'

W. D. ENGLE: 'The Effect of Bile on the Surface Tension of Water.'

GEORGE I. FINLEY: 'Recent Geological Correlation Work in the Cañon City Field.'

PHILIP FITCH: 'A Review of the Development of the Modern Kinetic Theory of Gases as a Basis for the Study of Radioactivity.'

F. L. ABBOTT: 'Producer-gas and Producer-gas Engines.'

J. VINCENT DANIELS: 'A Report on the Formation of Malic Acid by Fermentation.'

All of the institutions in the state of collegiate grade were represented by delegates, and a number of the larger high schools as well. A public address was given by Professor Thomas H. MacBride, of the State University of Iowa, his subject being 'The Response of Plants.' FRANCIS RAMALEY,

Secretary, Local Committee.

DISCUSSION AND CORRESPONDENCE.

A PERSISTENT ERROR.

MY attention has recently been called to an error in the use of geologic names, which, since I am inadvertently responsible, it seems desirable I should correct.

The terms Des Moines and Missourian have been in use for some years, especially in the publications of the Iowa and Missouri Surveys, for the lower and upper coal measures of the older classification. When I prepared for the 22d Annual Report of the U. S. Geological Survey a brief discussion of the western interior coal field, I was located in a mining camp with no opportunity for stenographic services. The report was, therefore, written out in long hand and sent down to Washington to be copied. Instead of being returned to me it went through the press, and I had no opportunity to examine it until the printed copies came to hand. It seems that in one of the early pages of the manuscript, by some inadvertence I had transposed the terms. The editor with painstaking care transposed them through all the remainder of the manuscript to correspond to this one wrong usage, and they appeared in this form in the published paper. The mistake was to my mind so obvious, and the usage so well established, that I never considered it worth while to make the correction. However, it misled Dr. Buckley, of the Missouri Survey, and in his report on the quarry industry the terms are accordingly misused. His attention having been called to this, the following note was made in the Geology of Moniteau County, page 8:

> Attention is here called to the names Missourian and Des Moines, in the use of which there is evidently some confusion. In the earlier reports of the Iowa and Missouri Geological Surveys the term 'Missourian' has been applied to the upper coal measures, and the term 'Des Moines' to the lower coal measures. In the late reports of the U. S. Geological Survey (22d Annual Report, part 3, plate 22, page 341), their use has been reversed, the term 'Missourian' being applied to the lower coal measures, and the term 'Des Moines' to the upper coal measures. These names were first applied in the Missouri reports during the Keyes administration, and there appears to be no good reason for reversing their application.

This would seem to have been sufficient to make the matter clear, but in the report of the coal-testing plant of the U. S. Geological Survey, Professional Paper 48, page 74, the wrong usage again appears. I desire, therefore, to enter protest in public against the persistence of the usage, which was a typographical mistake to begin with, and for which there is, as Dr. Buckley says, no good reason.

H. FOSTER BAIN.

THE NORTHERN LIMIT OF THE PAPAW TREE.

THE article by Dr. C. A. White in the May 11 issue of SCIENCE on the northern limit of

the papaw in the Mississippi Valley overlooks the occurrence of this tree at a point much farther north. The writer has noted its occurrence in the valley of Carroll Creek near Mt. Carroll, Ill., about five miles north of the forty-second parallel of latitude, or nearly one hundred miles farther north than the limits given by Dr. White, *and the tree there bears fruit.* A letter received to-day from A. B. Hostetter, of Mt. Carroll, states that the fruit seldom ripens, but that in favorable seasons members of his family have gathered and eaten the ripened fruit. The papaw in that locality seems to be restricted to the rocky gorge of Carroll Creek, a situation somewhat sheltered.

It may be of interest to note in this connection that the papaw has been reported by Wesley Bradfield, of the United States Forest Service, to extend as far north as Grand Traverse Bay in Michigan, or to about latitude forty-five degrees, and it is of common occurrence as far north as Grand Rapids, Mich., in latitude forty-three degrees.

Frank Leverett.

Ann Arbor, Michigan,
May 17, 1906.

After having read the communication from Dr. C. A. White in Science for the eleventh of May this year, relative to the northern limit of the papaw tree, I deem it my duty to inform the readers of your journal that this tree grows under a high bluff of sandstone on the south side of the Mississippi in the west end of Rock Island County, near a place known as Drury Landing.

Two weeks ago I saw these trees in bloom. I sought information regarding the ripening of the fruit and the testimony was unanimous by the residents in the neighborhood that the fruit may and does ripen even in this northern locality. It is known to have been offered for sale on the market in Muscatine, on the opposite side of the river. So far as the distribution of this plant along the Mississippi is concerned, it does not seem necessary to account for this by a hypothesis involving human agency, although we may take it for granted that man has been an agent of some consequence in the dispersal of its seeds.

J. A. Udden.

Rock Island, Ill.,
May 21, 1906.

SPECIAL ARTICLES.

PARALLEL DEVELOPMENT IN BRACHIOPODA.

'Brachiopod Homœomorphy: *Pygope, Antinomia, Pygites.*'—The writer has presented a paper with the above title to the Geological Society of London, and it was read on March 21. It deals with the diphyoid Terebratulæ, of which so many species have borne the name *Terebratula diphya* (Colonna). It is noted that this name is pre-Linnean, and can, therefore, only date from the time when it was revived by L. von Buch, 1834. Prior to that several names had been given to these shells. The first were *Terebratula cor* and *T. pileus* given by Bruguière in 1792 in the *Journ. Histoire Naturelle.* This paper has been entirely overlooked by workers on these shells. Bruguière's names indicate a perforate and an imperforate species, respectively. Consideration is then given to the synonymy of certain diphyoid species: *T. triangulus,* Valenciennes in Lamarck, which was actually founded on Bruguière's own figures of his *T. pileus,* reproduced in 'Encyc. Meth.'; *T. triquetra,* Parkinson, which includes two species, a perforate and an imperforate; and *T. antinomia,* Catullo, which covers various species. These and others all antedate *T. diphya,* von Buch.

Terebratula diphya is not the type of the genus *Pygope,* as all text-books say; for Link, the author of the generic name, referred only to *T. antinomia,* Catullo. Reasons are given for taking as the type of *Pygope* one of the forms of *T. antinomia* which is considered to be the same species as *T. deltoidea,* Val. Then the later generic name *Antinomia,* Catullo, is discussed. The genus was founded on five species; and one of them is now selected as the type — the genolectotype. This is *A. dilatata,* Catullo, supposed to be equivalent to *T. antinomia,* Catullo, that is, to what is now selected to be the type of that species. In that case the species would bear the name *Antinomia*

antinomia (Cat.). The two generic names *Pygope* and *Antinomia* are employed, because they are supposed to indicate two independent parallel genetic series, whose members differ in size and position of the perforation, and in characters of the lateral margin. But there is yet another series of diphyoids, typified by *Terebratula diphyoides,* d'Orb. It is pointed out that, although the species covered by the name *diphyoides* are very like *Pygope* as now used, yet they all differ in having particular characters in the preperforate stage — a dorsal ridge and a ventral sulcus. For this series de Haan's MS. name *Pygites* is used; and it is supposed that there are three genetic series of diphyoids which have developed independently, and that the remarkable perforate form, with its two lobes joined, has been evolved three times over. The three series develop from the glossothyridoid, to the bifidate, to the perforate (ordinary *T. diphya*) stage; and two series are supposed to finish by losing all trace of the perforation, the lobes completely coalescing (the imperforate stage), represented by *T. pileus,* Brug. = *T. triangulus,* Val. in Lamarck.

In compiling synonymies of the species in the three genera there have been found two other papers overlooked by Brachiopod bibliographers—one by E. Newman in the *Zoologist,* 1844, p. 679, naming *T. Duvali,* and one by Catullo. S. S. BUCKMAN.

GEOLOGICAL SECTION OF NEW MEXICO.

UNTIL within the past year no connected view of the geological formations of the New Mexican region has been possible. From the literature alone little of an exact sequence of geological formations could be made out. Since the work of the geological and mineral survey of New Mexico, under the direction of the School of Mines, at Socorro, has been undertaken much new and much-desired information has been obtained, until now a very satisfactory and correlated scheme of the rock succession has been constructed. The section is instructive on account of—(1) its completeness, (2) its easy parallelism with the better known sections of other parts of the continent, (3) the great development of certain of the major formations, and (4) the many great unconformities which represent long erosion intervals.

Nearly every one of the twenty-five larger formations, those having a taxonomic rank of series, are separated by marked unconformities. The recognition of these erosion intervals explains many hitherto unsolved phenomena regarding the relationships of the various formations, and enables exact correlations to be made in a way that is impossible among the terranes of most other localities, and largely without the use of organic remains. The section is as follows:

GENERAL GEOLOGICAL SECTION OF NEW MEXICO.

	Age.	Series.	Thickness.	Rocks.
Cenozoic	Quaternary	[illegible]	200	Gravels.
	Tertiary	Llano Estacadan	200	Shales.
		Arriban	500	Sandstones.
		Wasatchan	1,700	Sandstones.
		Nacimientan	800	Shales.
Mesozoic	Cretaceous	Laramian	3,600	Sandstones.
		Montanan	1,500	Shales.
		Coloradan	1,000	Shales.
		Dakotan	500	Sandstones.
		Comanchan	100	Sandstones.
	Jurassic	Morrisonian	200	Shales.
		Zunian	1,200	Sandstones.
	Triassic	Shinárumpan	1,500	Shales.
Paleozoic	Carboniferous.	Cimarronian	1,000	Shales.
		Guadalupan	2,500	Limestones.
		Maderan	1,000	Limestones.
		Manzanan	1,000	Limestones.
		Ladronesian	200	Shales.
		Socorran	300	Limestones.
	Devonian		400	Limestones.
	Silurian		100	Limestones.
	Ordovician	El Pasan	1,200	Limestones.
	Cambrian		300	Sandstones.
Proterozoic			3,000	Quartzites.
Archeozoic			5,000	Schists.

The most noteworthy features are the great development of the Tertiary and Cretaceous deposits, the presence of rocks of the Jurassic horizon, the completeness of the Carboniferous sequence, the representation of all systems of the Paleozoic, and the differentiation of the

Proterozoic clastics and the Archeozoic crystallines.

Charles R. Keyes.
New Mexico School of Mines.

BOTANICAL NOTES.

STUDIES OF ISLAND VEGETATION.

Two contributions to Atlantic island floras have recently appeared dealing with the plants of the Bahamas and the Bermudas respectively. Dr. Charles F. Millspaugh's 'Contributions to a Flora of the Bahamian Archipelago' issued (under the title 'Praenunciae Bahamenses, I.') by the Field Columbian Museum in February, 1906, is the first of a proposed series intended thoroughly to cover the flora of these islands. A large amount of material collected by many botanists has been brought together for the use of Dr. Millspaugh in his study of the species. The principal collectors represented are L. J. K. Brace (1875 to 1905); N. L. Britton (1904–5); E. G. Britton (1905); W. C. Coker (1903); Wm. Cooper (1859); A. H. Curtiss (1903); F. S. Earle (1903); M. A. Howe (1904–5); C. F. Millspaugh (1904–5); G. V. Nash and N. Taylor (1904); A. R. Northrop (1890); J. T. Rothrock and A. S. Hitchcock (1890); A. E. Wright (1905). The families of plants represented in this paper are *Amaranthaceae, Euphorbiaceae, Rubiaceae, Verbenaceae* and *Solanaceae*. New species are described in each of these families, aggregating fourteen in all, and two new genera of *Verbenaceae* are characterized. It is noteworthy that both generic and specific descriptions are in Latin, in accordance with the growing feeling among botanists that all new descriptions should be so written.

The second paper is a 'List of Plants Collected in Bermuda in 1905' by Albert H. Moore. It is the result of collections made by Mr. Moore in Bermuda in July and August, 1905. The specimens (with few exceptions) were determined by comparison in the Gray Herbarium of Harvard University. As a result we have a list of 221 species, two of which are new to science. The latter are illustrated by reproductions of photographs. Eleven species are listed as endemic in Bermuda, including three ferns, a juniper, two sedges, a palm, a *Sisyrinchium*, an *Elaeodendron* (tree of a new species), a *Statice*, and an *Erigeron*. The descriptions are in Latin here also, and the nomenclature is in accord with the rules adopted in the Vienna congress last year.

From the other side of the world we have a pamphlet of about one hundred pages devoted to Philippine plants, and containing five papers, viz.: 'New and Noteworthy Philippine Plants, IV.'; 'Notes on Cuming's Philippine Plants in the Herbarium of the Bureau of Government Laboratories'; 'Notes on Philippine *Gramineae*'; '*Scitamineae* Philippenses'; 'Philippine *Acanthaceae*.' Many new species are described, two of which are of especial interest, viz: *Acer philippinum* and *Fraxinus philippensis*. Neither one of these genera had been known previously on the islands. The *Gramineae* are treated by Hackel, the well-known agrostologist of Gratz, Austria.

In this connection mention should be made of *The Philippine Journal of Science*, the first number of which was issued by the Bureau of Science of the Government of the Philippine Islands in January of the present year. Its purpose is the publication of the researches of the Bureau of Science. There are to be ten numbers a year, aggregating approximately one thousand pages, and these are to take the place of the bulletins hitherto issued by the government laboratories. The subscription price is placed at five dollars per year.

ANOTHER NOMENCLATURE RULE.

In his 'Leaflets' issued April 10, 1906, Dr. E. L. Greene prints a timely and vigorous protest against the dedication of more than one genus to any man, however eminent, and calls attention to the practise of some of the earlier masters of botany, who promptly suppressed duplicate names. Thus Dr. Torrey rejected *Wittea*, proposed by Kunth in honor of De Witt Clinton, with the comment 'it would be inadmissible to bestow two genera on the same person,' holding that *Clintonia*

fully satisfied the demands in the case. Dr. Green approves of this decision of Torrey's, and speaks of the principle involved as 'a law so plain that it never seemed to need formal and verbal enactment until within the last decade.' He holds that it is far better 'to name one good genus after a man' than 'to use his name as a merely convenient foundation for the making of a dozen different names'; the first he considers to be a real honor, while of the latter he asks 'is not that to openly dishonor him?' Thus he accepts *Washingtonia,* but rejects *Neowashingtonia,* which he characterizes as 'impossible in any but a weak and degenerate system of nomenclature.'

SEASIDE LABORATORIES.

Attention is now directed to the increasing opportunities for the study of plant [and animal] life at waterside laboratories. For those who can make the trip probably no more attractive combination of camp life and a study of an unfamiliar vegetation can be found than is afforded by the Minnesota Seaside Station on the westerly shore of Vancouver Island, whose session begins July 8, and closes August 18. It is under the direction of Professor MacMillan, of the University of Minnesota. — Much like it, but much nearer, is the Biological Laboratory on Long Island, at Cold Spring Harbor, where from July 5 to August 18 instruction will be given in various lines of botany, especially of the lower forms. The botanical work here is under the direction of Professor Johnson, of Johns Hopkins University. — At Woods Hole, Massachusetts, the nineteenth session of the Marine Biological Laboratory is announced to open June 1 and to extend to October 1, with instruction in botany from July 5 to August 16. The opportunities for investigation in this long-established laboratory are such as should induce many an advanced student to spend the summer there. The botanical work the present season is to be under the supervision of Dr. George T. Moore, of Washington, D. C.

NOTES ON RECENT BOTANICAL PAPERS.

Among noteworthy botanical papers may be mentioned Professor Pond's 'Incapacity of the Date Endosperm for Self-digestion' in which the author shows by a series of careful experiments that, contrary to the views of many botanists, the endosperm of the date is not capable of self-digestion, and that such digestion as takes place in the seed is due to the enzymes in the embryo. — Botanists will remember Dr. A. F. Blakeslee as the discoverer of the secret of zygospore formation in the Black Moulds (*Mucorineae*), and will learn with interest that he has been studying in Germany at the University of Halle, where he has continued his work on these interesting plants. His distribution of the + and — sexual strains of *Phycomyces nitens* and other species of *Mucorineae* has made it possible for botanists everywhere to have zygospores for laboratory study. The paper accompanying the specimens, entitled 'Studies in Mucorineae,' is mainly an abridgment of the full paper published a year or so ago in the Proceedings of the American Academy of Arts and Sciences. With it he gives, also, a brief summary of an interesting paper on 'Zygospore Germinations in the *Mucorineae*' originally published in the 'Annales Mycologici' early this year, in which he shows that such zygospores require a period of rest before germination, and determines the stability and instability of the sexual strains in *Sporodinia* and *Mucor.* — Professor Underwood's paper, 'American Ferns, IV.' (reprinted from the *Bulletin of the Torrey Botanical Club,* 1906, pp. 189–205), includes notices of forty species of Pteridophytes which have been added to the flora of the United States since the publication of the last edition (1900) of his book 'Our Native Ferns and their Allies.' — Professor Blankinship has brought together a mass of interesting information in his paper on the 'Native Economic Plants of Montana,' published as Bulletin No. 56 of the Montana Experiment Station. He has given especial attention to the uses of these plants by the Indians. — M. A. Howe's 'Phycological Studies,' I. and II. (reprinted from the *Bulletin of the Torrey Botanical Club,* 1905 and 1906) include new *Chlorophyceae* and *Rho-*

dophyceae from Florida and the Bahama Islands. A dozen good plates, partly photographic, accompany these studies. — Recent papers by Professor F. L. Stevens include 'The Science of Plant Pathology' (a popular discussion, first published in the *Popular Science Monthly*, September, 1905), 'Oogenesis and Fertilization in *Albugo ipomoeae-panduranae*' (a cytological study from the *Botanical Gazette*, October, 1904), 'A Nature-Study Lesson with the Moulds' and 'A Simple Experiment on Spontaneous Generation' (both popular articles for teachers and pupils in the public schools, originally published in the *Nature-Study Review*). — Dr. E. J. Durand's recent papers on fungi include 'The Genus *Sarcosoma* in North America,' 'Three new Species of Discomycetes' and '*Peziza fusicarpa* and *Peziza semitosta*,' all from the *Journal of Mycology*. — Professor Halsted's 'Report of the Botanical Department for 1905,' published by the New Jersey Agricultural Experiment Station, is as usual a marvel in the way of containing the results of an astonishing number of experiments and observations. Many fine half-tone reproductions of photographs add much to the usefulness of this admirable report.

Charles E. Bessey.
The University of Nebraska.

THE WORCESTER POLYTECHNIC INSTITUTE.

The Worcester Polytechnic Institute has just awarded a contract for the erection of a new building to be used exclusively for electrical engineering. It is designed to have this building put up as rapidly as possible so that it may be used during as large a portion of the next school year as possible. The building has been designed by the firm of Peabody & Stearns, Boston, architects. Professor A. W. French, the head of the civil engineering department at the Worcester Institute is to act as consulting engineer and superintendent of construction.

The plans for this building have been under consideration for some time and it is the intention of the trustees to make it the most thoroughly equipped and up to date electrical engineering laboratory anywhere in this country.

The large general laboratory will have a length of 200 feet and a width of 55 feet. This with three galleries which form a part of the plan will give a floor area of 19,400 square feet and will constitute what is undoubtedly the largest electrical engineering laboratory in the world. This laboratory will be served by a ten-ton electric controlling crane covering the entire central portion of the laboratory between the galleries. The galleries will be served by two-ton controlling hoists covering their entire length. The usual lecture rooms, recitation rooms, and design rooms and special laboratories and workshops are to be found in the building; but the feature upon which the greatest amount of thought has been expended and the feature which will undoubtedly attract the greatest amount of attention is the electric railway testing laboratories. The Worcester Polytechnic Institute is a pioneer in this kind of work and is at the present time the only institution in the United States where an independent chair in electric railway engineering has been established. Connection will be made with the tracks of the Worcester street railway system, so that electric cars can be run directly into the laboratory and the tests conducted there.

Ample facilities are also to be provided for work in connection with insulation and with high potential transmission. The equipment of the laboratory will permit the use of voltages of any desired frequency and potential up to 750,000 volts for the study of the various problems of long-distance high potential power transmission and the dielectric and electrostatic phenomena of insulating and other material.

The plans as drawn by Peabody and Stearns provide for an attractive building architecturally. In its location the building will front on Salisbury Street, directly opposite Institute Park, thus giving it one of the most beautiful locations to be found in the city.

L. L. Conant.

THE DANISH ARCTIC EXPEDITION.[1]

FEW Arctic expeditions, if any, have been more carefully planned and prepared than the forthcoming Danish or 'Danmark' expedition, as it is officially called. The necessary funds, about 250,000kr., have been raised partly by a government grant and partly by private subscriptions. Mr. L. Mylius-Erichsen, the leader of the expedition, distinguished himself by his determined pluck and energy as leader of the Danish Greenland expedition, which made its way across Melville Bay to the Cape York Eskimo settlement on the west coast of Greenland; and he has been universally complimented by Sir Clements Markham, Professor Fridtjof Nansen, and other eminent authorities for the plan he is now about to realize.

Leaving Copenhagen on July 1, the *Danmark* will proceed to the east coast of Greenland and try to make its way through the ice as far north as possible, further north than where Sabine and Clavering landed in 1823. The first problem which will present itself to Mylius-Erichsen will be to ascertain whether Eskimo are to be found further north; if not, what has become of them, and by what route have the Eskimo made their way to East Greenland. From the place of landing the expedition will proceed by sledges along the east coast, winter *en route,* and push ahead to the northernmost point of Greenland, the most northerly land in the world. This, in Mylius-Erichsen's opinion, is the most favorable place from which to make an attempt at the Pole; the latitude is a high one, about 84 degrees, and, what is of the greatest importance, these parts are singularly rich in game, musk ox, ice-bear, etc., a fact which will enable a sledge expedition for the Pole to set out with strong, fresh dogs, fed on natural food. The expedition will return to the ship in time to winter there the second year.

The most interesting and adventurous undertaking of the whole expedition yet remains —namely, what Mylius-Erichsen, who is not given to strong expressions, himself calls the fairly daring plan of traversing, by means of ski, dog-sledges and automobile, the inland ice of Greenland on the broadest portion of this continent. Nansen's famous crossing of Greenland took place much further south, where Greenland is much narrower; and Peary, who followed the northern slopes, had the great advantage of being in touch with the coast.

Mylius-Erichsen's plan is this: About March, 1908, he sets out, accompanied by one of his staff and two Greenlanders, belonging to the crew, the other members of the expedition, with fully-loaded sledges, going with him the first third of the journey. When they return, Mylius-Erichsen and his three followers proceed into the entirely unknown 'ice-dome' of the interior of Greenland, which rises to as much as 10,000 feet above the level of the sea. It is completely devoid of vegetable and animal life, and here one of the northern hemisphere's cold-poles is supposed to be found. At the coldest season man can probably not live there. Therefore, Mylius-Erichsen has chosen the months of March, April and May for this expedition. By means of ski, dog-sledges, and motor-car, which Nansen thinks can be used there with advantage, Mylius-Erichsen hopes to compass this exceedingly venturesome journey in about two months and a half.

From the west coast the four men proceed by a special vessel to a place on the southern part of Greenland's east coast, where they join the *Danmark,* which has in the meantime gone further south, and returned to Denmark. The expedition numbers 22 Danes as well as two German scientists, all specially fitted for the work, officers, artists, scientists, etc., some of them members of former Greenland expeditions, and all will be treated alike, receiving the same pay, etc. Motor-boats and wireless telegraphy will be special features of the equipment.

[1] The London *Times.*

SCIENTIFIC NOTES AND NEWS.

DR. JOSEPH D. BRYANT, of New York City, has been elected president of the American Medical Association.

Oxford University will, on June 20, confer the degree of doctor of science on Dr. Alexander Graham Bell.

Preliminary announcements have been sent out by the secretary in regard to the joint meeting of Section B of the American Association for the Advancement of Science and the American Physical Society, which will be held at the time of the summer meeting of the Association at Ithaca, June 29 to July 3. The announcement calls attention to the fact, already noted here, that the formal opening, with appropriate ceremonies, of the new physical laboratory of Cornell University will take place on the evening of Friday, June 29.

At the celebration of the twentieth anniversary of the founding of the society of Sigma Xi, which is to be held at Ithaca on July 2, during the meeting of the American Association for the Advancement of Science, Dr. J. C. Branner, vice-president of Stanford University, is to give an illustrated lecture under the auspices of the society. His subject will be 'The Great California Earthquake.'

The committee appointed by Governor Pardee to investigate the causes of the recent earthquake has presented a preliminary report. The committee includes Professor Andrew C. Lawson, of the State University; Professor G. K. Gilbert, of the United States Geological Survey; Professor Harry Fielding Reid, of the Johns Hopkins University; Professor J. C. Branner, of Stanford University; Professor Charles Burckhalter, of the Chabot Observatory, and Professor W. W. Campbell, director of Lick Observatory.

Mr. William M. Chase has undertaken to paint the portrait of President Angell, which will be presented to the University of Michigan.

We learn from *The Botanical Gazette* that Dr. E. N. Transeau, Alma College, Michigan, has been appointed a member of the staff of the Station for Experimental Evolution, at Cold Spring Harbor. He will work at evolutionary problems from the ecological side.

Dr. E. von Dungern, professor of bacteriology and hygiene at Freiburg, has been appointed director of the scientific section of the Krebs Institute, Heidelberg.

Professor Fridiana Cavara has been made director of the Botanical Gardens at Naples.

Dr. J. F. Payne, Harveian librarian of the Royal College of Physicians, has been elected to an honorary fellowship at Magdelene College, Oxford.

M. Paul Bruardel, professor of medical jurisprudence at the University of Paris, has presented his resignation in view of the fact that he will shortly be seventy years of age.

Professor D. E. Smith, of Teachers College, Columbia University, has sailed for Spain, where he will spend the summer in seeking for early mathematical manuscripts and text-books.

After January 1, 1907, the collection of copper statistics for the United States Geological Survey will be in the hands of Mr. L. C. Graton. During the coming summer Mr. Graton will visit the principal copper camps of the country, including those of the Lake Superior, Bingham and Butte districts, as well as the four great camps of Arizona at Clifton, Bisbee, Globe and Jerome, and the district about Redding, Cal.

Dr. A. S. Warthin and Dr. F. G. Novy, of the University of Michigan, have been invited to give papers before the British Medical Association at its meeting in Toronto in August.

President Woodrow Wilson, of Princeton University, and Dr. Albert Shaw, editor of *The Review of Reviews,* have agreed to lecture on American politics at Columbia University in the academic year 1906–7. The lectures are made possible by the gift of $150,000 by Mr. George Blumenthal, to establish a chair of politics.

Dr. W. H. R. Rivers will deliver the Croonian lectures before the Royal College of Physicians of London on June 12, 14, 19 and 21, the subject selected being the action of drugs on fatigue.

In order to perpetuate the memory of the late Professor Charles Emerson Beecher, who

was professor of paleontology in Yale University and a member of the governing board of the Sheffield Scientific School from 1897 to the time of his death in 1904, the friends of Professor Beecher have established a fund of $10,000 to be known as the Charles Emerson Beecher Memorial Fund. The income of this fund is to be devoted to the interests of instruction or research in natural history studies in the Sheffield Scientific School, but during the life time of Mrs. Beecher and her children the income of the fund is to be paid to them.

DR. KARL ROBERT EDOUARD VON HARTMANN, known for his philosophical and literary publications, died at Berlin on June 6, at the age of sixty-four years.

WE learn from *Nature* that Baron C. R. von der Osten Sacken, author of numerous books and papers on the classification of Diptera, died at Heidelberg on May 20 in his seventy-eighth year.

COLUMBIA UNIVERSITY is to have a 6½-inch equatorial, suitable for student work. The glass has been presented by Mrs. Wilde, and completely refined and refigured by Messrs. Alvan Clark's Sons, of Cambridgeport.

MR. CLARENCE B. MOORE, of Philadelphia, who has spent many years in exploring the mounds of Florida, has made a gift of a large part of his archeological collection to the museums of Stockholm, Berlin, Yale and Harvard.

ARRANGEMENTS have been completed, under a plan outlined by Alfred Mosely, to send, between November and March, five hundred British teachers to the United States and Canada to study the educational systems of the two countries.

THE committee on food standards of the Association of Official Agricultural Chemists, which has been commissioned by Congress to collaborate with the secretary of agriculture in fixing standards of purity for foods and determining what shall be regarded as adulterations, will hold its next meeting on June 18, at the bureau of chemistry, Washington, D. C.

WE learn from *The British Medical Journal* that a General Institute of Psychology, specially intended for the study of the phenomena of subconsciousness, the investigation of the causes of criminality and the discovery of means of curing social evils will shortly be formally constituted in Paris. Among those to whom the initiation of the scheme is mainly due are Professors Brouardel, d'Arsonval and Gariel, and MM. Boutroux, Giard and A. Picard. In January last M. Dubief authorized a lottery of four millions of francs, the product of which will be applied to the purchase of a site for the proposed institute and the erection of a building containing a series of fully-equipped laboratories, a library and a museum.

ON June 5 the senate bill for the preservation of American antiquities passed the House of Representatives. The senate bill to regulate the landing, delivery, cure and sale of sponges, passed the House of Representatives with amendment.

The British Medical Journal says: "Mr. Henry S. Wellcome is organizing an exhibition in connection with the history of medicine, chemistry, pharmacy and the allied sciences. It is his aim to bring together a collection of historical objects illustrating the development of the art and science of healing throughout the ages. The exhibition, which will be strictly professional and scientific in character, will not be open to the general public. For many years Mr. Wellcome has been engaged in researches respecting the early methods employed in the healing art, both among civilized and uncivilized peoples. In particular it has been his object to trace the origin of the use of remedial agents. There is a considerable amount of information scattered throughout the world in folk-lore, in early manuscripts, and in printed books, but the difficulties of tracing out and sifting the evidence are great. Mr. Wellcome will greatly value any information sent him in regard to medical lore, early traditions or references to ancient medical treatment in manuscripts, printed works, etc., and he undertakes that the greatest care shall be taken of any objects of

historical medical interest lent for the exhibition."

UNIVERSITY AND EDUCATIONAL NEWS.

THE Woman's College of Baltimore has received gifts amounting to $580,000. Of this amount $500,000 was needed to clear the college of debt and $80,000 will be added to the endowment fund. Mr. Andrew Carnegie gave $50,000; the Massey estate, through Mr. Chester D. Massey, Toronto, Canada, $50,000; other gifts range from small amounts to $30,000. The treasurer of the college puts the assets of the college as follows: Grounds, buildings and equipment, $701,000; endowment, $719,135.

GOVERNOR HIGGINS has approved a bill appropriating $80,000 for a school of agriculture at St. Lawrence University, with an additional $12,000 for maintenance. This school, it is understood, will be managed in cooperation with the authorities of the State College of Agriculture at Cornell University.

BY the will of Catherine L. R. Catlin, of New York, $60,000 is left to religious and charitable institutions, including $10,000 to New York University.

THE administration building at Vanderbilt University, which was destroyed by fire on April 20 of last year, involving a loss of over $250,000, is nearing completion again. The walls are of stone, brick and terra-cotta, and the floors, ceilings and roof are of reinforced concrete so that destruction by fire will not again be possible.

THE electors to the Linacre professorship of comparative anatomy, vacant by the death of Professor Weldon, will proceed to an election in the month of July. Candidates are desired to send in their names so as to reach the registrar's office not later than July 7. No testimonials are to be submitted, but candidates are invited to send in with their names eight copies of a brief statement of their career and of their scientific work and experience.

AT Yale University the following appointments have been made: Leo Frederick Rettger, M.A., Ph.D., assistant professor of bacteriology and hygiene in the Sheffield Scientific School; William Ebenezer Ford, Jr., Ph.D., assistant professor of mineralogy in the Sheffield Scientific School.

IN the College of Physicians and Surgeons, Columbia University, Dr. Philip Hanson Hiss, Jr., has been promoted to a chair of bacteriology and Dr. F. C. Wood to a chair of clinical pathology.

AT Barnard College, Columbia University, Dr. Herbert M. Richards has been promoted to a professorship of botany; Dr. Edward Kasner, to an adjunct professorship in mathematics; Dr. Ida H. Ogilvie and Miss Margaret A. Reed have been appointed tutors in geology and zoology, respectively; Dr. Vivian A. C. Henmon has been appointed lecturer in psychology.

THE non-resident professors engaged for the summer session of the University of Wisconsin are Miss Jane Addams, Hull House, Chicago; Professor Gilbert A. Bliss, mathematics, Princeton; Professor Albert Perry Brigham, geology and natural history, Colgate; Professor Louis H. Burch, manual arts, Western Illinois Normal School; Professor Henry R. Fairclough, Latin, Leland Stanford Junior University; Professor Edward J. Lake, art and design, University of Illinois; Professor Thomas K. Urdahl, political and social science, Colorado College; Professor Claude H. VanTyne, American history, University of Michigan; Professor William H. Williams, mathematics, Platteville Normal School. Besides these non-resident professors a large number of the regular members of the university faculty will give courses in the summer session, including Professors Munro, Bardeen, Ely, Harper, Hohlfeld, Pyre, Showerman, Trowbridge, Voss, Kahlenberg, Daniels, Elliott, C. E. Allen, Laird, Lathrop, Frost, McGilvary, Slichter and Tressler.

DR. AUGUSTUS G. POHLMAN, of Buffalo, has been appointed associate professor of anatomy in Indiana University.

DR. KNIGHT DUNLAP, instructor in psychology at the University of California, has been elected instructor in psychology at the Johns Hopkins University.